

Thesis Title           Dose Perturbation at Metal/Tissue Interface  
                          from Cobalt-60 Teletherapy Treatment

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#### ABSTRACT

Many patients with laryngeal and pharyngeal cancers may contain metal or PVC tracheostomy tube to relieve airway obstruction that suppressed by the tumor. Some patients with retinoblastoma may have artificial eyeball replacement after enucleation. These materials will create inhomogeneity/tissue interface in Cobalt-60 irradiation field. The dose perturbation factors of the artificial eyeball measured by the TLD rods are in a magnitude of  $\pm 3\%$  and are field size independence. The eyeball attenuated very small amount of radiation within  $\pm 2\%$  due to small different in the effective atomic number of the artificial eyeball and the perspex phantom. The dose perturbation of tracheostomy tubes are represented as the dose factors which are the ratios of the measured dose with the tube compared to the measured dose at the same point in the phantom without the tube. The dose factors strongly depend on the location of measuring points related to the figure of the tube. These factors are in the range of 0.85 to 1.10 (  $-15\%$  to  $+10\%$ ). The dose at the curvature surface directly below the air inlet hole of the tracheostomy tubes are changed in the range of  $-12\%$

to +10% and -2% to +6% for metal and PVC tube respectively. These changing of the dose resulted from the combination of scatter, attenuation and buildup phenomenons. The dose on the phantom surface under the PVC and metal tracheostomy tube flanges are 73% and 51% increased respectively. This is because of the flange thickness increased the dose at the surface to be the maximum.